

DISCUSSION ON LOGIC - Analysis or Synthesis of a Body of Knowledge

> (Definition of Fact - a concept [a word] which corresponds to the reality that is apparent to our five senses [our five "instruments of knowledge"].)

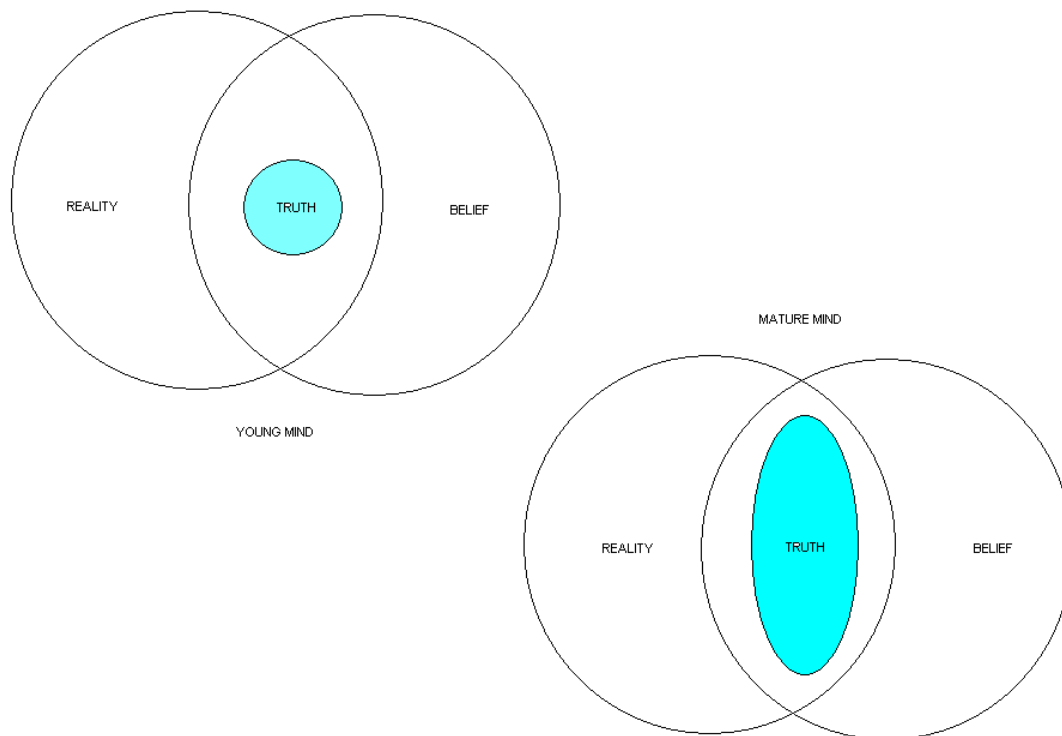
LOGIC is the ~~method~~ method for thinking correctly, that is, thinking without contradiction; the art of non-contradictory identification.

After a body-of-knowledge is gathered and properly arranged through grammar, the topic or proposition must be understood. When all of the stated contradictions have been removed from the proposition by subjecting it to logic (this work is called "proof"), the proposition is said to be understood. All of the relationships within the proposition - and to reality - are in concurrence; there remain no contradictions; all of the statements within the proposition are related *facts*.

The description in the previous paragraph is an awkward way of stating the logical *Law of Non-Contradiction*. Presented figuratively, "An existent cannot be 'A' and 'non-A' at the same time and in the same respect". For example, a fire truck cannot be red and non-red at the same time. It might be painted another color at another time, but it is now red. The red color might appear as a shade of gray in a black & white photograph, but in respect to the normal human eye, it is still red. This may not seem remarkable, yet it is the key to grasping knowable reality. In the objective universe, direct observations tell us that there exist absolutely no contradictions! "Everything" is in harmony. Contradictions exist only within the mind of man through the misuse of free will (misinterpretations). Logic is meant to minimize these misinterpretations.

Logic is the field originally identified and described in the Western World by Aristotle of Stagira, the philosopher, and arranged as the *Organon*, meaning the "organ of knowledge". It is, even among his other intellectual feats, his greatest achievement. It is man's *method* of passing from the known to the unknown, thereby, making it known - ad infinitum: it is the diagram to the understanding of ~~new~~ knowledge. As logic concerns itself with establishing the non-contradictory, it provides a functional definition of **truth**: a proposition in correspondence with objective, factual reality (i.e., a conceptual statement with no innate disagreements).

Below are diagrams relating personal belief and objective reality to the position of truth. They illustrate the schematic structure of "Truth" but also the the growth of understanding as a normal mind progresses from youth to maturity. If the Trivium Method of thought is in use, a proportionally greater convergence of the areas of "Reality" and "Belief" along with and increase of the blue area of "Truth", will be present



Logic consists of four basic elements: 1] the informal logical fallacies, 2] the rules of definition, 3] the rules of deductive reasoning, and 4] a guide for inductive reasoning

The Common, Informal Logical Fallacies- so called because these mistakes or intentional deceptions made in arguments exist in *either* form of reasoning - *deductive* or *inductive*. Familiarity with these twenty-plus fallacies will aide when one is presented with outside arguments or one's own thought processes which seem, on first glance, to be valid - but *something*, intuitively, does not quite fit. The *something* which does not fit can often be segregated and identified as *commonly* fallacious. That is, these flawed, contradictory propositions are so commonly used that a list has been compiled to apply as a shortcut in dismissing their content in logical argument (reasoned analysis and synthesis).

Fallacies of Relevance:

>Appeal to inappropriate authority- *Argumentum Ad Veracundiam* (Simply because a recognized authority presents an argument does not necessarily mean it is valid. This is, by far, the most commonly occurring fallacy)

>Appeal to pity- *Ad Misericordiam*

>Appeal to emotion- *Ad Populem*

a. Prestige Jargon- use of technical wording to intimidate

b. Use of Derogatory Humor to intimidate.

>Appeal to force- *Ad Baculum*

>Irrelevant conclusion- *Ignoratio Elenchi*

a. Argument from incessant repetition- *Ad Nauseum* (Filibuster; mass media advertisement)

>Argument from ignorance (Onus of Proof Principle [ignorance of the fact that a *negative* cannot be proven, or that a proposition cannot be called proven due to the *lack* of positive proof])- *Ad Ignorantium*

>Argument against the Man- *Ad Hominem, abusive and circumstantial* (The opposite of veracundiam. An argument is not necessarily invalid because it is proposed by a particular individual: the argument should be judged on its own merits, its own content.)

Fallacies of Presumption:

>Begging the question - *Petitio Principii*

- a. Circular reasoning
- b. Restatement

- 1. Arbitrary redefinition

- c. Complex question- question asked in such a way as to presuppose truth of some conclusion buried in the question: leading questions.

>*Non Sequitur*- it does not follow.

- a. False cause; Effect and Cause are not in alignment.

- 1. After this, therefore, because of this (luck, superstition, etc.)- *Post Hoc*

ergo Propter Hoc

Fallacies of Ambiguity:

>Equivocation- Using the same term in arguments inconsistently, in differing senses. (This is another very commonly used fallacy, especially in legal, political, and ecclesiastical debate. Intense training is required to detect this fallacy as it is very subtle.)

>Amphiboly- Undue ambiguity owing to imprecise or improper grammar.

>Accent- applying inappropriate emphasis to a particular term in a statement.

>Composition- reasoning from attributes of the parts of a whole, to the whole itself.

>Division- reasoning that what is true of the whole must be true of the parts.

A list of the major fallacies, along with some of their Latin names, is provided so that you may perform an internet word search, or refer to any introduction to classical logic text under *informal logical fallacies* to enumerate and explain the particulars on this or any of the following topics. (A word search on any proper name or technical term mentioned in this letter might further clarify the included concepts.) I recommend this element be studied and understood before advancing to the other three as it is one of the most easily comprehensible and useful in day-to-day life. The contemporary thinker Carl Sagan called this element the “Baloney Detection Kit”; Aristotle called it the “Refutation of the Sophists” in referring to a philosophically skeptical school-of-thought which originated in his era. So, one can detect and refute all manner of present day sophistry and baloney as experienced in mass-media advertising, journalism, politics, from legal and medical professionals, and even intelligently question some assumptions in the of subjects history or science as they have been presented to us... just to name a few applications!

There is no one, definitive list of fallacies. The fallacies listed above, mostly Aristotle's, are usually considered the major fallacies. There are other, more contemporary lists, including the one to follow, which duplicates some fallacies already mentioned.

Baloney Detection Kit - A modern compilation of fallacies by Carl Sagan.

The following are suggested as tools for testing arguments and detecting fallacious or fraudulent arguments:

Wherever possible, there must be independent confirmation of the facts.

Encourage substantive debate on the evidence by knowledgeable proponents of all points of view with the object being to find **contradictions** within the proposition under examination.

Arguments from authority carry little weight (in science there are no "authorities").

Spin more than one hypothesis - don't simply run with the first idea that caught your fancy.

Try not to get overly attached to a hypothesis just because it's yours.

Quantify, wherever possible.

If there is a chain of argument every link in the chain must work; no **contradictions**.

Ask whether the hypothesis can, at least in principle, be falsified (shown to be false by some unambiguous test). In other words, is it testable? Can others duplicate the experiment and get the same result?

Additional issues are

Conduct control experiments - especially "double blind" experiments where the person taking measurements is not aware of the test and control subjects.

Check for confounding factors - separate the variables.

Common fallacies of logic and rhetoric

Ad hominem - attacking the arguer and not the argument.

Argument from "authority" (in science there are no authorities, only objective facts).

Argument from adverse consequences (putting pressure on the decision maker by pointing out dire consequences of an "unfavorable" decision).

Appeal to ignorance (absence of evidence is not evidence of absence: a negative cannot be proven).

Special pleading (typically referring to god's will).

Begging the question (assuming an answer in the way the question is phrased: leading question).

Observational selection (counting the hits and forgetting the misses).

Statistics of small numbers (such as drawing conclusions from inadequate sample sizes).

Misunderstanding the nature of statistics (*President Eisenhower expressing astonishment and alarm that fully half of all Americans have below average intelligence when expressed as a **mean** average. He mistakenly supposed it was an arithmetic average.*)

Inconsistency (e.g. military expenditures based on worst case scenarios but scientific projections on environmental dangers thriftily ignored because they are not "proved").

Non sequitur - "it does not follow" - the logic falls down.

Post hoc, ergo propter hoc - "it happened after, so it was caused by" - confusion of cause and effect. (A comet appearing in the sky coincides with the start of a drought and is mistakenly thought to be the *cause* of the drought, etc.)

Controlled opposition - "staging" opposition to an issue in order to claim the pre-arranged outcome had been tested by objective debate (the American political structure which declares having two independent parties but has only one - "Big Government").

Meaningless question ("what happens when an irresistible force meets an immovable object?").

Excluded middle - considering only the two extremes in a range of possibilities (making the "other side" look worse than it really is).

Short-term v. long-term - a subset of excluded middle ("why pursue fundamental science when we have so huge a budget deficit?").

Slippery slope - a subset of excluded middle - unwarranted extrapolation of the effects (give

an inch and they will take a mile).
Confusion of correlation and causation.
Straw man - caricaturing (or stereotyping) a position to make it easier to attack..
Suppressed evidence or half-truths.
Weasel words and phrases - for example, use of euphemisms for war such as "police action" to get around limitations on Presidential powers. *"An important art of politicians is to find new names for institutions which under old names have become odious to the public"*

The Rules of Definition - the method by which to isolate the *essence* of a word/concept. "Definition" is the heart of logic.

In the West, the philosopher Socrates, the Father of Definition, first recognized the need to establish common conceptual ground in argumentation and communication. Socrates' emphatic prescription to clear the muddle, contradiction, and confusion of men's minds was to, **"Define your terms !!!"** ("terms" being used synonymously with "words" in this case). The 'Socratic Method' consists of defining all terms within an argument (a proposition) until there are no contradictions or inconsistencies within it. If inconsistencies are still present, the argument is considered to be in error (the *negative* holds the field in logic - *Argumentum Ad Ignorantium*).

Aristotle later discussed the notions of providing a positive statement with positive terms; describing what a concept *is*, not what it *is not*, where possible. He also made use of *genera and species* (general and specific commonalities), to place the term being defined into a classification with other similar terms, and *differentia* (distinctions), to display the defined term's unique individuality within the class. This seeks a reckoning which is not too broad, too narrow, too circular, nor too vague for the term. It is this human ability to have awareness of abstract similarities among existents, or awareness of *universals*, in the lexicon of philosophy, which is another unique feature of our conceptual capacity. Care must also be taken to avoid making conflicting statements within the same definition.

The study of this element seems to enhance both intellectual discernment or judgment (to find meaning) and value judgment (to find, of course, "value"; to accurately evaluate).

*The following two elements are concerned with the two things the human mind does or, in fact, "**can do**" while thinking : [1] deduce (analyze) - mentally taking things apart or [2] induce (synthesize) - mentally combining and putting things together or generalizing. It is crucial to understand these simple definitions; many cultural factions try to unnecessarily complicate and confuse this issue.*

The Rules of Deductive Reasoning - (mentally taking things apart) the process of passing from known general principles to particular cases in cognition. From the base of *immediate logical inference* which derives a conclusion from a single antecedent statement or implication, the tri-termed *syllogism* (connected discourse) was described and fully explored by Aristotle. A valid *middle term* is connected to two previously accepted valid general terms, major and minor premises, and serves as a conclusion in

deducing syllogistically. A thorough familiarity with grammar is required in order to parse sentences and entire statements in this category of analysis. Deduction is most useful for establishing the "validity and/or truth content" of a statement more so than the uncovering of "new knowledge".

The process of coming to a valid conclusion usually follows a spectrum of evidence. The first conclusion is that of the *possible*; there is "some" amount of evidence for the conclusion but not a preponderance of evidence. The next level is that of the *probable*; there is a "preponderance", or a majority of evidence for the conclusion. The final level is that of *certainty*; "all" of the evidence points to the conclusion and there is no evidence against it - the evidence is conclusive.

This is the most demanding of all the elements to study because an exhaustive amount of technicality is known about it. So, I will not pursue any detail here (refer to texts or internet).

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The Guide for Inductive Reasoning - (mentally putting things together, or forming valid generalizations) the process of passing from particular instances to forming valid general principles in cognition. This is the primary channel to "new knowledge". Aristotle provided only a guide for this category of reasoning, rather than set rules, because the ancients did not have a valid and complete understanding of concept formation. And, we do not have a firm grasp of the process of concept formation to this day.

Axiomatic induction, which defined sensible (i.e., via the five senses), self-evident, irreducible axioms like Existence, Identity, and Consciousness, was known to the ancients. And they had what was termed *perfect or enumerative induction* which was, hypothetically, to observe every instance of a phenomenon before advancing a general statement of principle (essentially saying, one has to know everything before knowing anything [!]: an impossible task). However, this did lead to a synthesis, called *genuine induction*, which could provide reasonable probabilities, rather than certainties, after observing the consistent results in several instances.

Not until Francis Bacon hinted at the fundamentals of the *Scientific Method* and Isaac Newton used it to integrate the Science of Physics, was the confident declaration of a universal assumption realized.

The Scientific Method:

1] Observe natural surroundings to pose a specific question in the physical universe (again, that which is apparent to the five senses); 2] formulate multiple hypotheses in attempting an answer to that question; 3] extrapolate from the most likely hypothesis to devise an experiment for proof of that hypothesis; 4] conduct a repeatable experiment for corroborative proof and with which to deduce a Statement of Theory.

"If multiple theories fit the evidence equally well, choose the simplest as the preferred statement". This maxim is called "Occam's Razor", the Law of Parsimony, which is the final consideration in the process of the scientific method. Nature's Laws, when discovered, are elegantly simple; it is man's imagination which tends to (confused) complexity.

Science is the discipline of *demonstrating* phenomena as defined by Aristotle. In modern terms, it is the discipline of "*experimental demonstration*". If a hypothetical proposition cannot be successfully demonstrated and independently corroborated by experiment in the physical realm, it is still a hypothesis, not yet science. Science can be said to be the "Art of the Possible" because it is demonstrated in the realm apparent to everyone through their senses. The 19th century philosopher John Stuart Mill codified the Scientific Method mentioned above and also developed another body of inductive modes headed Mills Methods : [1] Method of Agreement, [2] Method of Difference, (3) Joint Method of Agreement and Difference), [4] Method of Residues, and [5] Method of Concomitant Variation.

There is one important fallacy which applies to inductive thought. It is simply called *Hasty Generalization* - a premature inductive conclusion made without consulting the general, common fallacies, or by corroborative use of the Scientific or Mills Methods.

Analogies (methods of making comparisons) are perceived as potentially powerful means of communicating ideas, but most of us are unsure as to why this is the case. The reason is that metaphors/personifications, allegories, and similes - the various forms of analogies - are inductive in their nature, as well. They usually refer to general or universal themes in their comparisons.

Logic is most often defined as the discipline of Valid Inference. Historically, the "*form of **explanation***" in discourse was not more fully developed until the time the philosophic process-of-thought matured and the scientific-method process-of-thought was introduced. "Explanation" is a statement in which the cause (the all important WHY) of the proposition is antecedently known. That is, for explanations to exist, a critical-mass-of-knowledge forming a causal data base must be in place. Until *written* records began to supplant records kept by oral tradition, there was an insufficient and inappropriate data base: "explanation" was not prevalent in ancient times. Therefore, a method of checking or validating one's "inference" from an implication - which could be derived from comparison (analogy), direct awareness, and/or testimony - was greatly needed. Aristotle filled that need by describing the "method of *deductive* logic" when ***implication and direct inference*** was the dominant form of discourse. A certain sense of Ancient Western History and familiarity with the theory of poetry and literature can assist in comprehending the distinction between logical thought and analogical thought.

Logic is an uneven subject and study; it is a series of pointers. Part of the field is communicated through explanatory commentary, but concrete examples (case studies) of the various concepts must also be examined before the student *gets it*. I stress, if you pursue the study of logic, confine your inquiries to Classical or Aristotelian Logic. So called Symbolic Logic, having omitted the use of concepts, cannot help in making evaluations. It is a field unto itself, more properly a discipline akin to syntax, but certainly *not* logic.

SUMMARY

> The work of logic is proof.

> Proof consists of following the definition of a new or unfamiliar concept or proposition

along a chain of previously defined concepts which are connected to a known Principle (this is deduction), or experimentally demonstrating phenomena in reality to "discover" a Principle (this is induction).

- > Principle - a foundational truth, usually ostensive, upon which other truths depend.

- > The effect of a logical proof is human understanding of a subject. That is, the process of "proving" the terms and propositions of a subject yields understanding.